STAT 1321/2320: Applied Time Series

MW 4:30 pm − 5:45 pm in 209 Lawrence Hall

	Name	Email	Office Location	Office Hours
Instructor	Kiran Nihlani	kiran.nihlani@pitt.edu	1802 Posvar Hall	Check Canvas Page
TA	Xu Zou	xuz72@pitt.edu	1803 Posvar Hall	Check Canvas Page

Course Description

An introduction to commonly used time series analysis models along with implementation of the models within data examples using the R statistical software. The course will be a fair mix of theory and practice.

Course Prerequisite

A sound familiarity with undergraduate or graduate statistics, and regression analysis but also basic programming proficiency, linear algebra and basic calculus.

Learning Resources, Technology & Texts

- **Recommended Reading:**

  1. Shumway, R.H., Stoffer, D.S. (2006), Time Series Analysis and Its Applications (with R examples), Springer-Verlag, New York (E-book)

  2. Brockwell, P.J. and Davis, R.A. (1991), Introduction to Time Series and Forecasting, Springer-Verlag, New York (E-book)

  3. Tsay, R.S. (2005), Analysis of Financial Time Series, 2nd Edition, Wiley Series in Probability and Statistics (E-book)

- **Software:** Throughout the semester we will use the software R. See the Canvas page for detailed download instructions.

- **Canvas:** You can access the course via Canvas. It is strongly suggested that you explore and become familiar not only with the site navigation, but with content and resources available for this course.

- **Lecture Material:** The material for this class will be broken down into 7-9 topics. An incomplete version of the slides will be posted on Canvas before the lecture for you to fill along in class. You MUST be in class to get the completed version of slides.

- **Gradescope:** Gradescope will be used to turn in assignments for this class. You will have access to Gradescope **once the first assignment has been posted**. Refer to the Canvas page for more Gradescope submission guidelines to be followed.

Assessments

- **In class activities.** These are active learning activities that we will do during class. These activities can be done either individually or in a group but must be submitted individually. They will be graded for content. The activities will be made available on Canvas and you will be given 24 hours after class to finish the activity and turn it in. You should expect an in-class activity on most weeks.

- **Homework.** There will be approximately 5-6 homework assignments. Homework assignments will be available on the Canvas course page under the Assignments tab. Not all homework assignments would be weighted equally. Homework assignments may differ between the undergraduate and graduate section of the class.

  Rules:

  - All assignments should be your individual work; otherwise, points will be deducted.
  - Your homework should be neat and well-organized. Show you work, circle your answer. Your TA is a student like you and will not take time to decipher poor handwriting, put pages in order, or read notes scrawled in the margins.

- You will use Gradescope to turn in all your assignments. Submissions made on Gradescope are considered final. **It is your responsibility to make sure your submission has gone through completely and accurately. Technological issues will not be considered for a no penalty submission.**
  * If we aren't able to see/open your submission on Gradescope, it will be treated as a no submission.
  * Refer to Gradescope guidelines on Canvas for more information.
- **Exams.** There will be two midterms and a comprehensive final exam. Exams will have both in-class and take home components. Take home portions will be timed - you will have a set amount of time to complete it once your start. More details will be provided closer to exam dates.

Late Submission Policy

Due date for every homework assignment is provided on the course schedule posted in Canvas. Unless otherwise stated, assignments are due on those days. However, I recognize that sometimes "life happens." In these instances, you may use your allotted **two** grace days throughout the semester. These days allow you to submit an assignment up to two days late or two assignments one day late without penalty. You can use these days for any assignment and for any reason. You do not need to provide me with the reason: simply email the TA and COPY ME on that email and tell us how many of your grace days you would like to use. The days are used as a whole and cannot be broken down. Grace days will automatically be used if you don't email and let us know otherwise.

Once you've exhausted your grace days, point deductions will occur for any assignment submitted after the deadline. An assignment submitted within 24 hours of the due date will be graded on a 50% scale. Assignments submitted more than 24 hours after the due date will not be accepted.

The grace days and extensions apply only to HW assignments. No late submissions will be accepted for take home components of exams for any reason.

Exam Make-up Policy

All exams are required and there will be no make-up exams. Missed exams will receive a grade of zero.

Grading Policy

Point values for assignments and exams are given in the table below.If you feel an error has been made in grading one of your assignments, return the assignment to the instructor with a written explanation of the error, and the entire assignment will be re-graded. Re-grade requests should be submitted within one week of the graded assignment being returned to you. Although errors in recording grades are rare, mistakes can happen, therefore it will be important that you keep your graded assignments. This will allow mistakes to be corrected before the final grade is assigned.

Assessment	Percentage
In class activities	10%
Homework	20%
Midterm 1 (10/08/25)	25%
Midterm 2 (11/12/25)	25%
Final	20%

Grading Scale

Course grades will be determined as shown below. Final grades are not curved. You are evaluated on only your performance.

Letter Grade	Numeric Grade(in%)	Letter Grade	Numeric Grade(in%)	Letter Grade	Numeric Grade(in%)
A+	≥ 97	B	[84, 87)	C-	[70, 74)
A	[94, 97)	B-	[80, 84)	D+	[67, 70)
A-	[90, 94)	C+	[77, 80)	D	[64, 67)
B+	[87, 90)	C	[74, 77)	D-	[60, 64)
				F	< 60

Note: 10/24/2025 is the last day to withdraw from the course and receive a "W" grade. If you are failing, seriously consider withdrawing by this date to avoid getting an "F".

Tentative Course Schedule

Topic	Topics	Notes
1	Introduction to Time Series	
2	Theoretical Aspects of Time Series	
3	Stationarity and Estimating the ACF	
4	Time Series Regression	
5	Stationary Time Series Models - AR, MA, ARMA	
6	Non-stationary Time Series Models - ARIMA and SARIMA	
7	Miscellaneous topics I - Piecewise Regression	
8	Miscellaneous topics II - Introduction to Volatility Modeling	
9	Miscellaneous topics III -Lagged Regressions	

Attendance Policy

There is no mandatory attendance policy in class but you may earn extra credit points (1%) by attending lectures. Attendance will be taken randomly on one day per week. We have 13 weeks in the semester so you may miss a couple of classes and still get full credit. You must be in class to get these extra credit points. **No other extra credit opportunity will be provided during the semester and no further curving will be applied to the final grades.**

Classroom Courtesy

Please refrain from use of cell phones or other handheld devices during class time. Repeat offenders may have their attendance grade reduced, since it is a clear distraction from the class material. Use of laptops and tablets for class-related material is fine, but please refrain from any use or activity that will distract you or your fellow students.

You are expected to be on time and respectful of the instructor and other students. Office hours cannot be used to compensate for habitual absenteeism or completing assignments that you haven't worked on yourself.

Communications

All electronic communications will be handled through the Pitt e-mail system or Canvas messaging. Course-related emails should be primarily for administrative purposes, not explaining material, or receiving help on assignment problems. Students are expected to check their email and the course website regularly for announcements and materials. The average response times for emails/messages is 2 business days. Emails may not receive a reply over weekends.

In order for me to streamline the emails, the subject line for your email/message on Canvas should begin with **"STAT 1321 or STAT 2320"** to indicate which section you belong to. Emails without this information may get a delayed response.

Academic Integrity

Students in this course will be expected to comply with the University of Pittsburgh's Policy on Academic Integrity. Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an exam, including dictionaries and programmable calculators.

To learn more about Academic Integrity, visit the Academic Integrity Guide for an overview of the topic. For hands-on practice, complete the Understanding and Avoiding Plagiarism tutorial.

Statement on Classroom Recording

To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student's own private use.

Disability Services

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resources and Services (DRS), 140 William Pitt Union, (412) 648-7890, drsrecep@pitt.edu, (412) 228-5347 for P3 ASL users, as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.

Take Care of Yourself

Do your best to maintain a healthy lifestyle this semester by eating well, exercising, avoiding drugs and alcohol, getting enough sleep, and taking time to relax. Despite what you might hear, using your time to take care of yourself will actually help you achieve your academic goals more than spending too much time studying. All of us benefit from support and guidance during times of struggle. There are many helpful resources available at Pitt. An important part of the college experience is learning how to ask for help. Take the time to learn about all that's available and take advantage of it. You are encouraged to visit Thrive@Pitt to learn more about well-being and the many campus resources available to help you thrive.

The University Counseling Center is also here for you. You can call 412-648-7930 at any time to connect with a clinician. If you or someone you know is feeling suicidal, please call the University Counseling Center at any time at 412-648-7930. You can also contact Resolve Crisis Network at 888-796-8226. If the situation is life threatening, call Pitt Police at 412-624-2121 or dial 911.

One Final Note

I reserve the right to change my policies stated in this syllabus at any point in the semester. If I do make a change to a policy, I will announce it in class and post the change in an announcement on Canvas.